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STATEMENT FOR COMPREHENSIVE WATER POLLUTION CONTROL PROGRAMS

Keith S. Krause

Public Health Service
Washington, D. C.

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STATEMENT

for

COMPREHENSIVE

WATER POLLUTION CONTROL PROGRAMS

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STATEMENT ON COMPREHENSIVE PROGRAMS

Nature of Comprehensive Programs

Water is the universal solvent. Water will take into solution almost any solid, liquid, or gas that it touches. It also has the capacity to capture and hold in suspension large quantities of fine particulate matter. In nature, it always contains impurities and both the concentration and variety of impurities will increase as man puts water to his beneficial uses. An impurity becomes a pollutant when the concentration of the impurity reaches a level where it is objectionable to man, limits man's opportunity to use water, or in any other way interferes with man's enjoyment or use of water. Pollutants may be physical, chemical, or biological and they may stem from man-made or natural sources. The Federal Water Pollution Control Program is directed to the prevention and control of pollution and the maintenance of good quality surface and ground water for the maximum number of beneficial uses. In this context, water pollution control and water quality management are synonymous terms.

Comprehensive water pollution control programs are being prepared to insure that water of proper quality is available in the proper place at the proper time to support an expanding economy; to fulfill the Nation's desire for clean water to support recreation and instream uses; and to insure that these objectives are achieved with maximum efficiency, optimum expenditure, and equitable distribution of water pollution abatement costs. They are aimed at permitting use and reuse of our water resources many times over.

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Water pollution control can be achieved through industrial process changes, better land drainage practices, collection and treatment or removal of wastes at their source and through storage in reservoirs to provide streamflow regulation for quality control. We are interested and concerned about all these approaches in comprehensive program development. For purposes of this report we will discuss the major features of such programs.

The minimum annual cost to the Nation for collection and treatment of waste and reservoir storage for quality control is estimated to be $2.4 billion by 1976 (Committee Print No. 32, Senate Select Committee on National Water Resources, 86th Congress, Second Session). The size of expenditures required for quality control and the diffusion of responsibility through many levels of government, the development of comprehensive programs is a practical necessity. Comprehensive water pollution control programs make it possible to formulate mutually-supporting plans and coordinate the actions of Federal, interstate, State, and municipal agencies. The comprehensive program also provides a basic resource for cooperative actions on the part of municipalities, industries and interested citizens' groups. It seems imperative to us that we have a clear understanding of how water quality management into each river basin system.

The Federal Water Pollution Control Act (33 USC 466a) gives authority for the development of comprehensive programs and provides guidance on the elements to be included in those programs. At the very outset, the Act requires the Secretary of Health, Education, and Welfare, in cooperation

with other Federal agencies, with State water pollution control agencies, and will all other agencies, municipalities, and industries involved to develop comprehensive programs for eliminating pollution of surface and underground waters. It is strongly implied that the other elements of the Act will be applied within the framework of a comprehensive program. Thus the provisions for interstate cooperation and uniform laws; research, investigations, training, and information; grants for water pollution control programs; grants for construction of treatment works; provisions for a water pollution control advisory board; enforcement measures against pollution; and cooperation to control pollution from Federal installations can all be taken as important, but individual, elements of a nationwide comprehensive program. These are the means by which the plan will be implemented.

The Water Pollution Control Act, the President, The Congress, the Senate Select Committee on National Water Resources, the National Conference on Water Pollution Control, and the individual States have influenced the formulation and helped to define the dimensions of the comprehensive programs being developed by the Division of Water Supply and Pollution Control. The programs are comprehensive with respect to time in that existing problems are identified and solved to restore beneficial uses and preventive measures are formulated to insure future protection. They are comprehensive with respect to the type and source of pollution, including all substances that interfere with man's enjoyment or use of water whether those substances originate from man-made or natural sources. The programs are comprehensive with respect to coverage, including groundwater, lakes, estuaries, and coastal

waters as well as the flowing streams of the country. They are comprehensive with respect to water use, giving due regard to the improvements necessary to conserve waters for public water supplies, propagation of fish and aquatic life, other wildlife, recreational purposes, agricultural and industrial uses and all other legitimate uses. They are comprehensive in terms of participation, serving to coordinate the actions of water pollution control authorities at Federal, interstate, State, and municipal levels. They give impetus and definitive goals to the efforts for action of citizens' groups interested in the protection and preservation of clean water. Last, but not least, the programs are comprehensive in technology, incorporating the contributions of biologists, chemists, economists, engineers, microbiologists, oceanographers, and other scientific skills capable of contributing to a factual, scientific basis for a comprehensive water pollution control program.

An optimum plan for applying the various means and measures of controlling water pollution and for preserving the quality of water for legitimate uses now and in the future, is a major element of the comprehensive program. Many of the intensive investigations are undertaken to provide factual data for the plan. Knowledge is needed of the rate of economic development, of the time and place where water uses are likely to develop, of likely recreational trends and water needs, and of the quantity, character, time and place of probable waste discharges. Engineering data and operations analysis are needed to combine cost and effectiveness of various pollution control measures with benefits obtained to determine optimum conditions. The combination of measures to produce maximum results with minimum expenditure will vary according to time and

place in the basin and according to the nature of water resources (surface streams, groundwater, estuaries, coastal waters) to be protected.

To insure that control measures are effective and that wasteful inefficiency is avoided, a wide spectrum of scientific information and economic projections are required. The type and priority of individual investigations will vary from one basin to the next depending on the nature of water resources and the existence of pressing problems in any particular river basin. However, as a general rule, the following information should be assembled in each major water resource basin; (1) economic projections over a period sufficiently long to evaluate trends and permit long-range planning; (2) hydrological data and interpretative material; (3) basic information of the water resources' physical and biological characteristics; (4) projections of potential water uses and waste water discharges over the period of planning; (5) estimates of capability for collecting and treating wastes during the planning period; (6) calculation of streamflow regulation required to reduce the adverse effects of pollutants that cannot be removed or treated adequately at the source; and (7) operational or systems analysis for determining timing and optimum cost of control measures and other activities required to implement the comprehensive program. The comprehensive program will provide guidelines for establishing and meeting water quality criteria by water pollution control agencies at all levels of government. The program will also provide a

scientific basis for appraising the effect of reservoirs, diversion works, outfalls, and other construction activities on the quality of the natural water resources.

Plans for Developing Comprehensive Programs

In December of 1960 the National Conference on Water Pollution Control recommended that planning for the comprehensive development of each major river basin for water resources be established as a fixed national policy. The Senate Select Committee recommended that these comprehensive plans be completed by 1970. President Kennedy, in his Natural Resources Message of February 23, 1961, spoke of the urgency of developing comprehensive plans and stated that this Administration accepts the goal urged by the Senate Select Committee on National Water Resources to develop comprehensive river basin plans by 1970. The development of comprehensive programs to improve the quality of surface and groundwater and to preserve the quality of those waters for all beneficial uses has been designated as a major goal of the Federal Government.

In cooperation with the States, comprehensive programs will be developed in all 21 major drainage areas of the United States within the next decade. The criteria used to establish priority for the development of comprehensive programs are (1) the need to resolve critical water problems where pollution has curtailed water uses; (2) urgency to inte-

grate comprehensive water pollution control planning with planning for water resources development and construction schedules of the Bureau of Reclamation, Corps of Engineers, Department of Agriculture, and the States; and (3) readiness of Federal, State, interstate, and local groups to collaborate. Based on these criteria, the schedule shown on the following chart has been developed in consultation with other Federal agencies and the Bureau of the Budget.

Water pollution control exerts a strong influence on the plans for the construction of reservoirs and other water resources structures. Projections of water uses, water quality required to serve those uses, projections of waste water discharges, estimates of maximum efficiency of waste collection and treatment works, and fundamental scientific information that describes the effect on water quality of proposed water resources developments are important features that should be taken into consideration by the construction agencies. Costly errors will be avoided and the optimum development of the Nation's water

CURRENT STUDY SCHEDULE, (INTENSIVE PHASE) 133
COMPREHENSIVE PROGRAMS WITH ESTIMATED COST IN MILLIONS OF DOLLARS
JANUARY, 1963

BASIN PROJECT AREA	FISCAL YEAR																
	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Arkansas - Red Rivers			1.9														
Chesapeake - Susquehanna							4.2										
Colorado (Budgeted under Enforcement)							3.5										
Columbia (Incl. N. Pac. Coastal Basin.)							2.4										
Great Lakes - Illinois River							13.4										
Delaware River							1.4										
Ohio River - Upper Basin									2.8								
Ohio River - Lower Basin (incl. Tennessee)										5.0							
Missouri - Lower Basin (Incl. Red River of North)									3.0								
New England River Basins (Inc. Connecticut R.)									4.5								
Southeastern River Basins										3.8							
Tri-State Metropolitan Area										12.0							
Western Gulf Drainage Basins (Incl. Rio Grande-Pecos, Texas, & Sabine)										2.9							
Alaska Drainage Basins										1.6							
Central Pacific Drainage Basins											2.7						
Mississippi River - Upper Basins											2.2						
Middle Atlantic Drainage Basins												2.1					
Great Basin												0.9					
Hawaii Drainage Basin													1.1				
Missouri River - Upper Basins													2.2				
Mississippi River - Lower Basins (Incl White River)														2.8			
Summary:																	
Projects started in Fy	1	0	0	4	1	1	4	4	1	1	1	2	1	0	0	0	0
Projects operating during FY	1	1	1	5	6	7	10	14	15	15	12	13	10	6	4	3	1
Projects closed end of FY	0	0	0	0	0	1	0	0	1	4	1	4	4	7	1	2	3

resources will be enhanced by the early development of comprehensive water pollution control programs.

Progress in Development of Comprehensive Programs

There are three phases in the development of comprehensive water pollution control programs. These are: (1) intensive investigations, planning, and program formulation; (2) implementation of the program; and operation, including monitoring. (3)

At the present time, intensive investigations are in progress in the Chesapeake Bay - Susquehanna River Basin, the Columbia, the Delaware, the Great Lakes - Illinois, and the Upper Ohio River basins. Approximately 30 per cent of the land area of the nation and 36 per cent of the population are in the study areas. The location and coverage of programs under development are shown on the accompanying map. The following chart illustrates progress toward completion of the intensive investigations in each of the basins.

Arkansas - Red Rivers Basins - Under PL 660, the first major effort to develop comprehensive programs for water pollution control was initiated in the Arkansas and Red Rivers Basins in 1957. The basins are part of the southwestern and central plains region. They comprise an area of approximately 354,000 square miles, roughly 10% of the United States. Approximately 7,300,000 people now live in the Arkansas - Red Rivers Basins in all or portions of Arkansas, Colorado, Kansas, Louisiana, Missouri, New Mexico, Oklahoma, and Texas.

COMPREHENSIVE PROGRAMS IN OPERATION

F.Y. 1963

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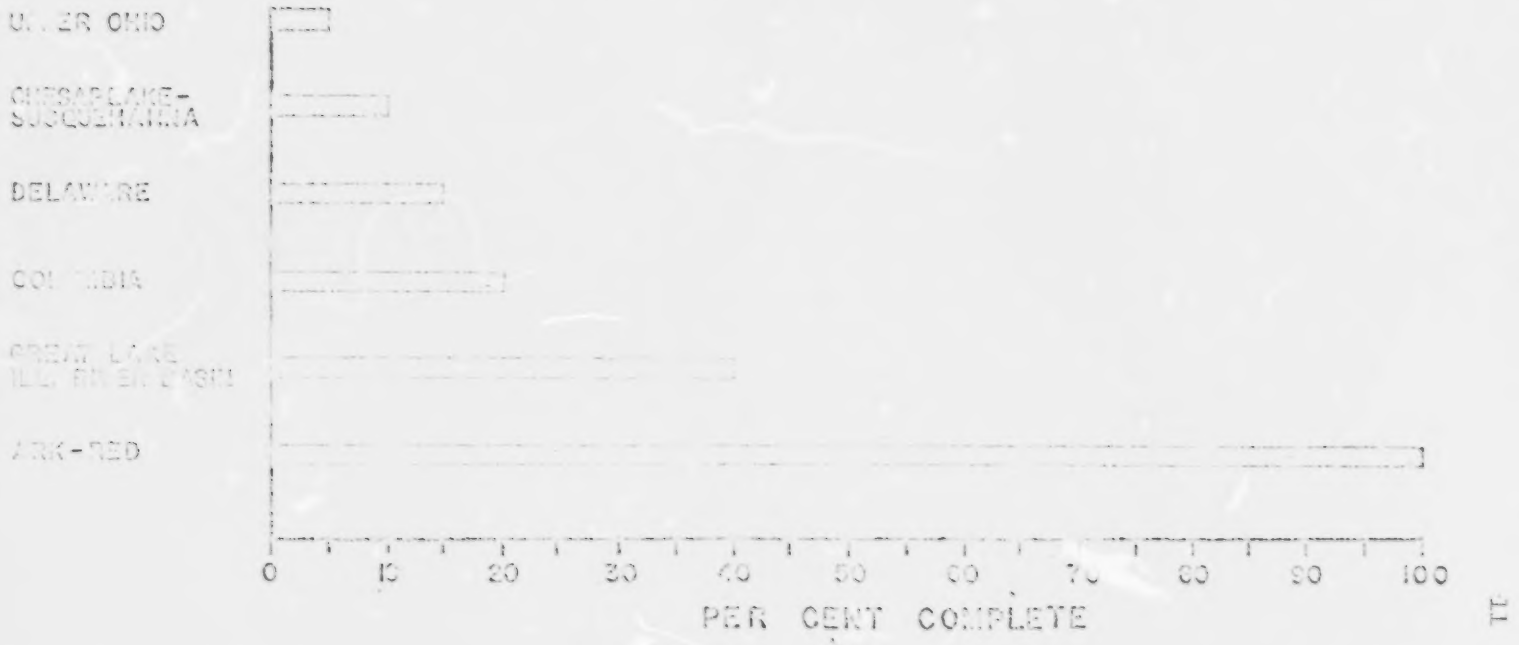
INTENSIVE INVESTIGATION PHASE
OF
COMPREHENSIVE PROGRAM DEVELOPMENT
1963



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In the water-short area of the southwest, the flow in the upper reaches of these rivers is heavily contaminated by natural pollution. Salt springs and soluble rock formations contribute approximately 26,000 tons of salt and gypsum to the rivers each day. Brine discharged at oil fields increases the pollution so that waters in the upper and middle reaches and their tributaries are unfit for most beneficial uses. Even after significant dilution with high quality rainwater runoff downstream in the eastern part of the basins, salt still imposes an economic burden on water uses in the downstream reaches of the rivers. The immediate objective in the development of a comprehensive program for the Arkansas - Red Rivers is to eliminate or substantially reduce the discharges from sources of brine so that the water may be used to support the expanding economy of the area.

The first step was to determine if the natural sources of salt pollution could be located and brought under control. Intensive investigations completed in the fall of 1962 revealed that 15 isolated points in the basin contribute a major portion of the natural pollution. At each of these sources (springs, seeps, and salt flats) there are several possible means of controlling or eliminating the salt flow. As recommended by the Arkansas - White - Red River Basins Interagency Committee Report of January 1957 (Senate Document No. 13, First Session, 85th Congress), the Project is a cooperative venture with the Corps of Engineers. The Public Health Service located and characterized the seeps, springs, and salt plains where natural pollution enters the rivers, and reviewed means and measures for achieving control.

The Corps of Engineers is investigating the sites identifiedby the Public Health Service to determine the cost and feasibility of various control measures.

The Public Health Service' Arkansas - Red Rivers Basins Project's intensive investigations have been completed, and the planning and program formulation is virtually complete. A report will be submitted to Congress during calendar year 1963. While working with the Corps of Engineers to find economical methods for controlling natural pollution, the Project also is cooperating with State and interstate agencies to bring man-made sources of salt pollution under control.

Provisions are also being made for the monitoring phase. A network of salinity measuring stations has been installed to judge the effectiveness of control works as they are built and put into operation. The monitoring network will also provide information to serve as the basis for desirable modification of the program as it progresses. Eventually, the monitoring network will provide operating guidance to the agencies having control over reservoir and diversion works in the two basins so that streamflow can be regulated to improve water quality.

A satisfactory completion of the salinity control program, will make available 31 million acre-feet of good quality water for continued economic growth. As the quality of water improves and is put to use in the expanding economies of the basins, other types of water quality management problems associated with urban, industrial and agricultural

development will arise. As the situation develops, the comprehensive plan and program will be adjusted to insure that the more common types of municipal and industrial pollution do not offset the advantages gained through salinity control.

Chesapeake Bay - Susquehanna River Basins - The Chesapeake Bay - Susquehanna River Project got underway in the late summer of 1960. Because of funding limitations, it did not become fully operational until 1963. The Project area encompasses parts of the States of New York, Pennsylvania, Maryland, and Virginia. The two waterways form an integrated water system that represents a major fraction of the water resources of the upper Atlantic region of the nation.

The Chesapeake Bay is perhaps the largest fishing and recreation area on the Atlantic coast. It is the home of a large game and commercial fisheries industry and the waters must serve increasing demands for municipal and industrial development. It is expected that 15 million persons will reside in the region surrounding the Chesapeake estuary by the year 2010, triple the present number. Water supply for these people, and waste disposal practices that will preserve the recreational potential of the Chesapeake Bay are major water quality management problems of immediate concern.

The major pollution problem at the present time in the Susquehanna basin is acid mine drainage which limits the use of water for municipal and industrial as well as recreational purposes. The area is

undergoing a transition to new industry to replace the coal mining industry. Water quality and availability are important factors in industrial relocation. The comprehensive water pollution control program under development will have as its goal good quality water for new industrial use and will protect the quality of water as the industries develop.

Preliminary work got under way in FY 1961, however, FY 1963 is the first year of "on schedule" operations. A field station was opened at Harrisburg, Pennsylvania, to serve as a base of operations for the Susquehanna River. High priority was given to a series of studies to determine the time-of-passage in tributaries and critical sections of the main stem of the river. Time-of-passage is an important factor in many water quality calculations and the information was sorely needed by State water pollution control agencies. From the office in Harrisburg and another opened in Baltimore, Maryland, the Project worked in cooperation with the States to assemble an up-to-date inventory of municipal and industrial water uses and waste water discharges.

Working with the Corps of Engineers and the Department of the Interior, the Project perfected and is putting into operation a system for handling data pertinent to the Susquehanna River-Chesapeake Bay area. Water quality data are costly to obtain and they must be made to serve as many purposes as possible. Many groups and agencies need access to these data

to carry out their responsibilities. This broad usage places great importance on uniformity of sampling and analytical procedures, and calls for an efficient system for data storage and retrieval.

The system being put into operation in the Chesapeake-Susquehanna Project was developed by the Basic Data Branch of the Division of Water Supply and Pollution Control and it will be used in all of the comprehensive programs. Because it is an efficient system not only for data retrieval but also because it furnishes a convenient coordinate network for the solution of many engineering problems, this system is receiving widespread attention from the other water resources agencies, and its broad adoption is expected within the next few years.

Economic studies are proceeding in a satisfactory manner. The Corps of Engineers and the Public Health Service are jointly financing a contract with the National Planning Association to meet the basic needs of the two agencies for economic data. In addition to the work by the National Planning Association, agricultural projections are being made by the Economic Research Service, the U. S. Department of Agriculture; also, the Bureau of Mines is assembling information on each of the mineral industries in the Project area. A careful cooperative effort is being made to assure that the various agencies operating in the Chesapeake-Susquehanna area base their actions on a common background of economic information.

Under contract with the Public Health Service, the Chesapeake

Bay Institute at Johns Hopkins University is completing a two-year study of all existing water quality information concerned with the Chesapeake Bay. This review puts existing information in a useful, readily available form. It also defines the gaps in knowledge where further investigations are needed. For instance, it has been revealed that a far better understanding of the currents and mass movements of water in the estuaries leading into the Bay is needed to permit rational location of waste water outfalls and predict the long-range effect of various types of pollution entering the Bay.

If budgetary support is forthcoming, dye studies and other oceanographic investigations will commence in 1964. A field station in the Annapolis-Baltimore, Maryland, area will be needed to support these studies. In addition to the studies on the Bay, a major program of sampling and measurement in the Susquehanna River Basin will be undertaken.

Columbia River Basin Project - The Columbia Project covers the States of Washington, Oregon, and parts of Idaho and Montana. Investigations were commenced in 1962. A comprehensive plan is being developed to meet water requirements of the Pacific Northwest over the next half-century with intermediate forecasts for a mid-period, 1980.

The water pollution control plan will emphasize prevention. While the area now has vast supplies of high quality water, the anticipated growth of population and the expansion of the economy will increase the amount

and variety of wastes to be discharged to the waterways. Without benefit of a comprehensive water pollution control program, deterioration of water quality experienced in other parts of the country may result.

A study plan was prepared and priorities of investigations were assigned after consideration of the proposed activities of other Federal agencies. The total area was subdivided into 12 sub-basins for a three-phase study plan. The first phase is concerned with the sub-basins having existing problems associated with municipal, industrial, and agricultural development. At the present time, investigations are in progress in the Yakima, Willamette, Upper Snake, and Lower Columbia areas. Contingent on appropriations, these studies will be substantially complete by the end of FY 1964. At that time, investigations will be expanded to include the other sub-basins.

Under contract with the Public Health Service, Washington State University, at Pullman, Washington, constructed a scale model of the Umpqua River Estuary. Tests with this model have demonstrated the probable distribution and dispersion of wastes matter that might be introduced into the estuary. The model will be helpful in water pollution control work planned for several estuaries in the Pacific Northwest.

A Major investigation concerns silt in surface runoff. Silt is produced in lumbering, road construction, and other land use practices.

Silt is particularly harmful to salmon and other game fishes, and imposes an economic burden by decreasing the capacity of reservoirs and increasing the cost of water treatment at municipalities and industries. A report on sedimentation production in the Pacific Northwest has been prepared and work is proceeding to determine modifications in forestry, road building, and other land management practices which might be instituted to minimize the silt load in surface runoff.

A major effort is being made to prevent water pollution from damaging the unique fisheries and recreational opportunities found in the coastal drainage areas of Washington and Oregon. The shellfish of Puget Sound are particularly susceptible to the effect of industrial waste from existing industries and industries likely to locate along its shores. To protect the fish and shellfish resources, oceanographic studies in the major estuaries and coastal areas will be intensified. An increase in temperature renders anadromous fishes susceptible to devastating diseases; therefore, temperature is an important pollutant in the Pacific Northwest. The temperature of surface streams is influenced by present design and operation of reservoirs. Studies are in progress to find means of reservoir design and operation which will provide desired water temperatures.

The plans for construction of reservoirs and full development of water resources for power, irrigation, and flood control are well advanced in the Pacific Northwest. It is imperative that water quality control

plans be brought abreast of the others. The Project is effectively coordinating its activities with other Federal and State agencies through the Columbia River Basin Inter-Agency Committee.

Delaware Estuary - The Delaware River Estuary Project was initiated in 1962. Upon completion of a water resources development plan for the Delaware River Basin under sponsorship of the Corps of Engineers, it was found that extensive water quality operational program evaluations were still needed in the estuary below Trenton, New Jersey. The States of Pennsylvania, New Jersey, and Delaware; the City of Philadelphia; and the Interstate Commission on the Delaware all requested that the Public Health Service undertake those studies.

In the last decade, the industrial growth of the area has been twice the National rate. In 1960 alone more than $600 million was spent by industry for new plants and equipment. The area has the largest oil refinery complex on the East Coast of the United States. Primary metal industries are a large user of water in the basin. As a result of the rapid economic growth, industrial and municipal water requirements have become critical factors.

In addition to the municipal and industrial problems, it is also necessary to determine the effects of changes in the estuary that may result from the construction of Federal reservoirs, now contemplated, in the Delaware Basin. Guidance derived from fundamental studies of the estuary is needed without delay by communities planning expenditures

for water supply and sewage treatment works. For instance, the City of Philadelphia is planning to spend millions of dollars on the improvements of water purification and water intake facilities. The city needs reliable information to predict the fate of upstream waste discharges and, in turn, the effect of waste discharges on quality raw water in the Delaware Estuary.

As a first step in the development of a water pollution control program, the relationships and responsibilities shared with States and interstate agencies were established. The field investigations included a large-scale dye study of the estuary to compare actual water movements with results obtained from a physical model built and operated by the Corps of Engineers. The tests illustrated the need for a full-scale study of the estuary to define mixing and dispersion of wastes discharged into it.

Of particular interest to water pollution control agencies throughout the country is the mathematical model for predicting dissolved oxygen conditions in the Delaware Estuary. This model was conceived by the Project, and is reaching an advanced stage of completion. Theory has been perfected and a check of the theory against continuous measurements at many points in the estuary for a full year shows remarkable agreement. This model may provide a breakthrough for scientific management of waste treatment facilities and streamflow regulation structures to give predictable quality conditions at desired location in a water resource system. The model, as well as being of extreme importance to

the Delaware will be highly useful in other projects and will point toward the type and extent of investigations needed in other estuaries.

Great Lakes-Illinois River Basins - The 1961 Appropriations Act contained an item of $500,000 to commence development of a comprehensive water pollution control program for the Great Lakes. The Great Lakes form the world's largest impoundment of fresh water and constitute a priceless National resource. Their quality effects the health and welfare of millions of people and will materially influence the economic development of a large portion of the United States. The effects of water pollution are seen in the increasing difficulties in treating lake water for domestic and industrial uses, the increasing number of bathing beaches closed, and the change from prized game fish to rough varieties in major parts of the lakes.

The lakes cannot flush themselves and thus purge pollution in the manner of a flowing stream; therefore, once their quality is destroyed generations may pass before it is restored. It is urgent to pinpoint the threats to water quality and take preventive measures before irreversible damage is done. In areas where quality has already been damaged, knowledge is needed to find means of speeding recovery after pollution is stopped.

During the first three years, special effort was made in the Illinois waterway and the southern end of Lake Michigan. In addition to the importance of these waters to the industrial complexes along the shores of Wisconsin, Illinois, Indiana, and Michigan, the Federal

Government needed information to protect the interests of the United States in cases pending before the Supreme Court. Four cases on the subject of diversion and water reserves of Lake Michigan are before a Special Master appointed by the Supreme Court. The United States is a party to these cases on its own motion because of the extensive national interests and treaty obligations involved.

In the late winter of 1960, the Solicitor General urgently requested the Department of Health, Education, and Welfare to undertake a study to develop information to protect the interests of the United States and assist the Special Master. Studies for this purpose of lower Lake Michigan and the Illinois waterway have been made. Reports have been prepared, and the Director of the Great Lakes-Illinois River Basins Project is presenting the material and expert testimony to the Special Master at this time. The Public Health Service will continue to provide assistance to the Justice Department until the cases are settled.

To support the initial studies, a project laboratory was established at Chicago. From that base the information needed for the Justice Department was assembled. In addition, the basic investigations needed to develop a comprehensive program have progressed. The Illinois River Basin was studied in detail. From those laboratory, engineering, economic, and other scientific investigations, recommendations are being made to abate existing pollution and prevent future deterioration of water quality in the Illinois Basin.

During the past year, a start was made on a study that will eventually fill many gaps in knowledge of the behavior of the Great Lakes. Early in the formulation stage, it was recognized that fundamental facts concerning the distribution o lake currents and the mass movements of waters in the lakes would be needed as a basis for a water pollution control program. Eleven current measuring stations, the first part of a 52-station network, were installed in Lake Michigan before ice cover formed this winter. A sketch of the stations, designed by project personnel in consultation with leading authorities in oceanography, is shown on the accompanying sketch. This is the first time that instruments of this type have been used in a lake. The sensitive recording devices will measure currents, wind, temperature and related environmental conditions, and store the information for several months on photographic film. A data processing scheme has been perfected to translate the millions of bits of information on the film directly to magnetic tape for feeding to the oceanographic computer at New York University from which a picture of the movements of water can be made.

A field station has been opened at Cleveland, Ohio, to support studies in Lake Erie and its drainage basin. Heavy pollution entering Lake Erie is causing the lake to "age" rapidly. Algae growth is profuse, dissolved oxygen drops to zero at times in some parts of the lake, many bathing beaches have been closed, and the fish population has changed to rough fish. The studies of Lake Erie are being coordinated with scientific institutions in Canada. The Corps of Engineers, the Fish and Wildlife Service, the Great Lakes Fisheries Commission, and

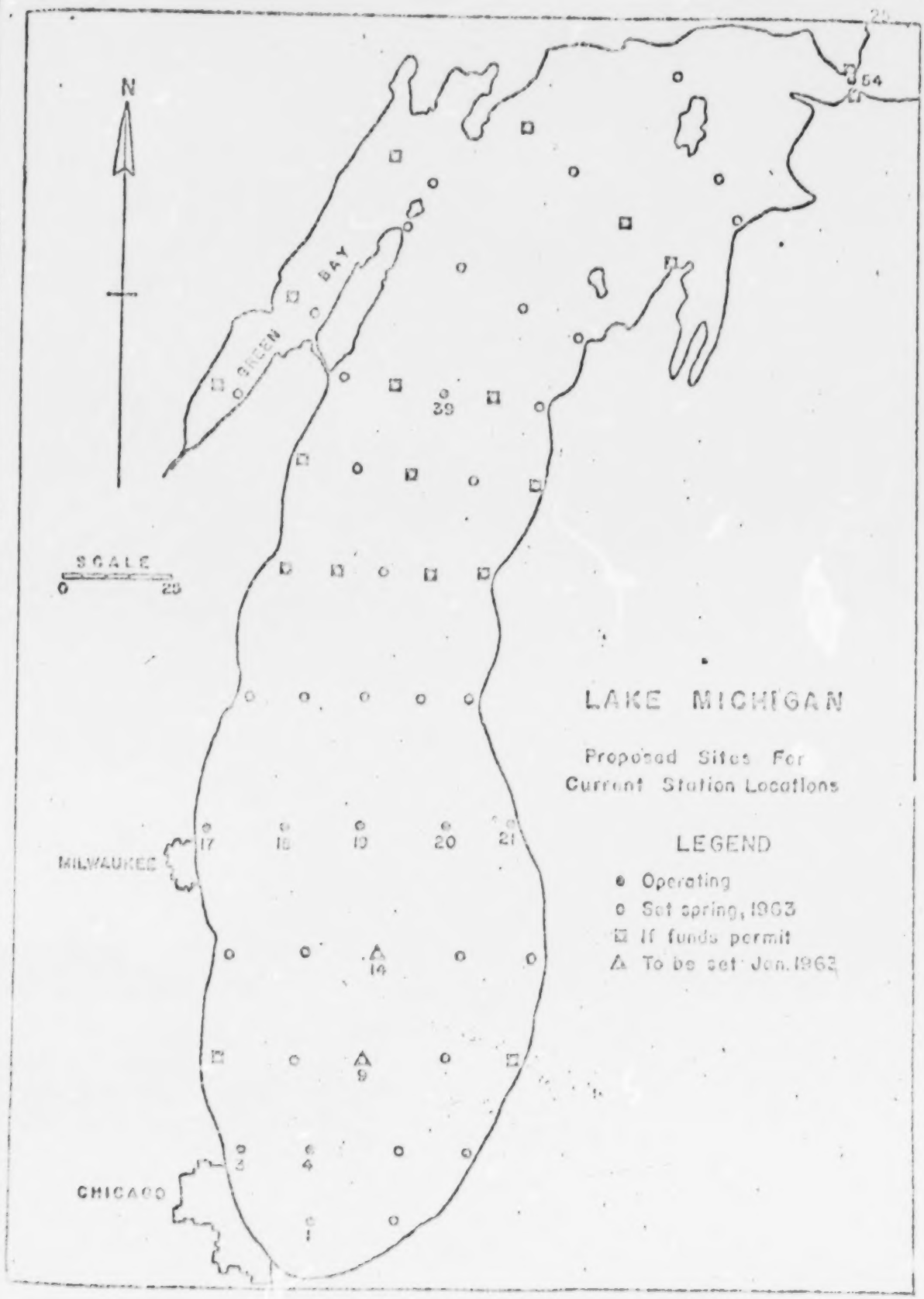

FIGURE NO. II-10

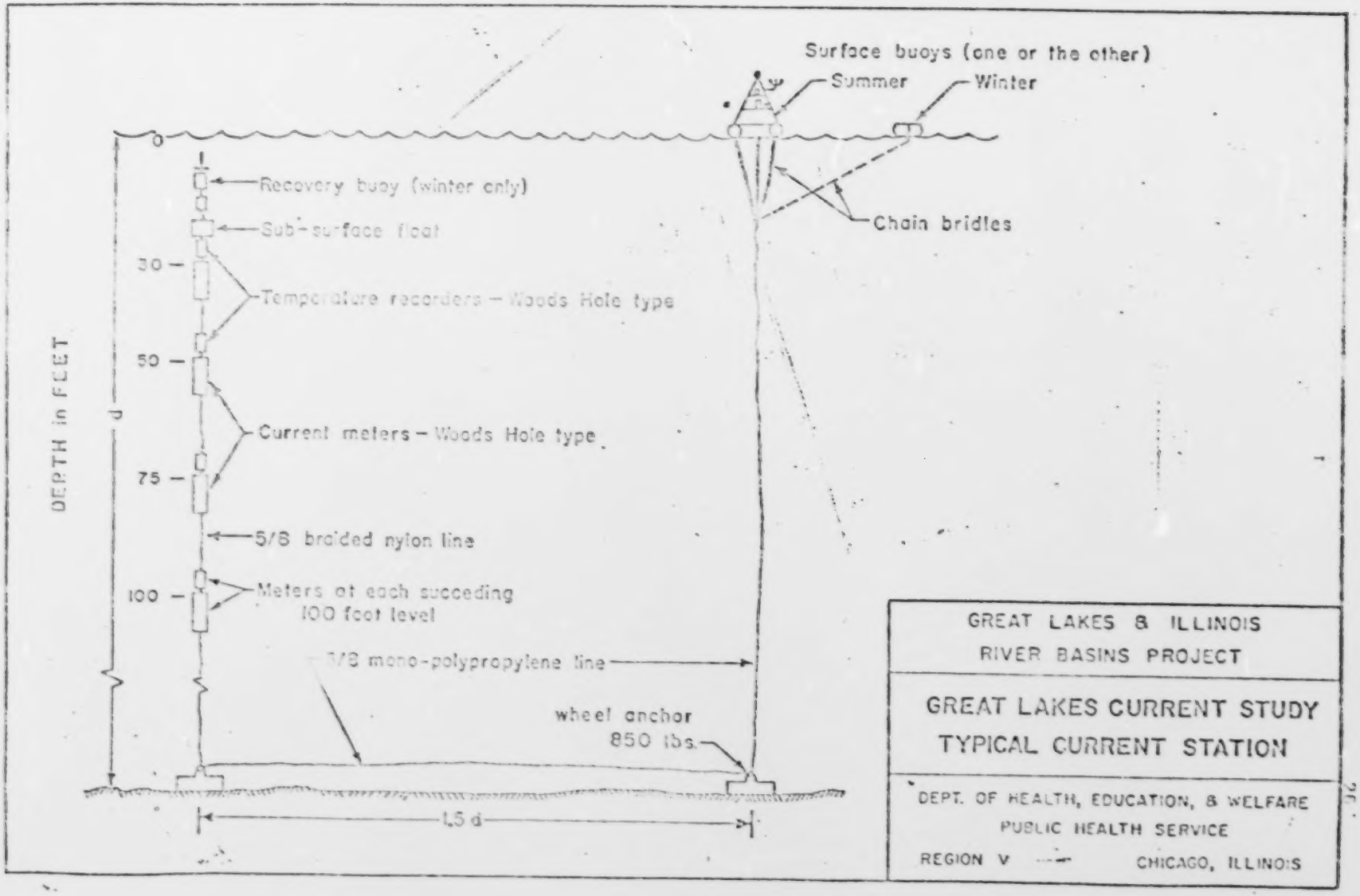

FIGURE NO. II-11

State and local agencies are participating in the studies.

In accordance with the study plan, investigations are to proceed to Lakes Huron, Ontario, and Superior. The intensive investigations are scheduled over a seven-year period and will be approximately 40 per cent complete by the end of FY 1963.

Upper Ohio River Basin - The Upper Ohio includes the drainage of the Monongahela and the Allegheny Rivers and the drainage area of the Ohio mainstem above the Kanawha River. All or parts of the States of Ohio, Pennsylvania, and West Virginia are included. The Project was authorized in the fall of 1962 with a limited budget of $100,000. A skeleton staff of ten persons has been assigned and a field station has been established at Wheeling, West Virginia.

This area is in the industrial heartland of America and contains some of the Nation's greatest unsolved pollution problems. These include widespread acid mine drainage as well as industrial and municipal waste discharges. A major portion of the Upper Ohio River Basin has been classified as an economically depressed area. The removal of acid from the waterways will restore vast quantities of water for municipal and industrial uses, and would be a big step toward revitalized industrial development. The area is endowed with natural assets to provide recreation for nearby heavily populated regions of the Nation. However, many streams are so highly acid that fishing and recreational uses are severely limited. Due to water pollution, there has been a steady

decline in recreation opportunities in the face of an increasing demand for recreation. The development of a large recreation industry in this economically depressed area is contingent on an immediate and sizeable effort to clean up its streams and lakes.

If the President's budget request is appropriated, a Project laboratory in Wheeling will be staffed and equipped, and a mobile laboratory unit will be acquired to support field work. Immediate studies will be conducted in the Kanawha and Little Kanawha Basins. The Mahoning River also will be taken under investigation. These river basin studies are needed, as soon as possible, to supply information to the U. S. Army Corps of Engineers and to fulfill the obligation of the Secretary, Department of Health, Education, and Welfare, to provide advice on the need for storage for flow regulation for water quality control.

Working arrangements have been made with Federal agencies; the state water resources, water pollution control, and fish and game agencies; and the Ohio River Valley Water Sanitation Commission. An inventory of waste water discharges and sources of acid mine drainage is being prepared. Data for projections of water uses and likely areas for recreation development are being gathered. Working in cooperation with the States and other Federal agencies, high priority will be given to systematic restoration of water quality in potential recreational areas.

Projected Activities - The start of four new comprehensive programs was requested in the President's budget for FY 1964. These are the New England River Basins, the Southeastern River Basins, the Tri-State New York Metropolitan area and Hudson River Valley and in the Missouri River Basin. The New England River Basins include the drainage of the Connecticut River as its western boundary and encompasses all of the water resources including coastal waters to the east of the Connecticut in the States of Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. The Tri-State area includes the drainage of the Hudson and Mohawk Valley and the harbor areas of Connecticut, New Jersey, and New York. The proposed seaway through Lake Champlain will be included. The Southeast River Basins includes Florida and portions of Georgia, Alabama, and Mississippi. The Missouri River Project will include the Red River of the North Basins. These Projects were earmarked for activities in FY 1964 after consideration of the three criteria: (1) existing water pollution problems; (2) willingness of States and local groups to participate; and (3) the stage of water resource development by other federal agencies.

Comprehensive Program Management

In the development of a balanced approach for initiating comprehensive water pollution control programs, a number of factors are important. One of the most important is timing. The project must be timed so that there is efficient utilization of scarce project leadership.

This particular item weighs heavily against simultaneous activities in all basins. Similarly, expensive scientific equipment can be utilized repeatedly in several projects, one after another, if proper scheduling is established and adhered to. Numbers of personnel and overhead can be reduced when the several projects are carefully scheduled to follow one another in a logical sequence.

The schedule for development of comprehensive projects, shown on page 8, was developed with regard to optimizing costs and efficiency, and for getting them started by 1970. The "64" President's budget request was based on the maintenance of the schedule referred to. If the financial resources are not forthcoming, reappraisal and rescheduling and re-coordination is required before [illegible] budget requests are made.

It should be pointed out that extensive pre-project planning is required to establish agreements and cooperative arrangements with other Federal agencies, State agencies, and local groups having an interest in these programs. Such agreements usually require that the other Federal, State and local groups have financial support for their part of the work. This adds to the lead time required by and complexity of coopera-tion.

Pre-project planning also includes a preliminary written prospectus of each individual project. This includes a statement of the area to be covered, the estimated time required, the objectives of the Project, and preliminary estimates of the total cost. It also indicates the

nature of the scientific investigations. The prospectus becomes the basis for more definitive discussions with other State and Federal agencies as the project firms up.

A proposed budget request for the first year of the project is drafted on the basis of estimated costs of the preparation of working plans, and field investigations which must be made during the first year of the project.

After the proposed budget request has been included in the President's request to Congress, the project planning is stepped up internally. Administrative action is taken to set up the project organization, position descriptions are prepared, tentative allocations of funds are made for the several persons and purposes to be served during the initial year, project headquarters sites are selected, etc. When an appropriation is made the first step is to assemble the project staff. After that, detailed work plans are perfected and adopted. These appear in documented statement containing firm estimates on the extent, location, and nature of field facilities, scientific equipment, contract specifications, and skilled manpower requirements for the succeeding two years. Each year this document is revised and updated as necessary. Now the project is ready to engage in its primary purpose.

These steps are taken to insure that a project starts and continues in a logical and orderly manner as soon as possible after funds are authorized by Congress. We have been able to develop such working agreements, detailed work plans, and to get the previously named projects under way, although not always in the optimum manner desired.

Those of us who are responsible for comprehensive water pollution control program development are convinced that comprehensive water pollution control projects and their ensuing plans can be developed and carried out. We are also convinced that such plans are necessary to prevent future water quality crises; to provide each basin with an operational plan for water quality management for insuring extensive and continuing reuse of waters for beneficial purposes enumerated in the Act. Water quality problems of the future are likely to be more complex than they are now. Greater and greater quantities of water will undoubtedly be withdrawn from our streams and underground resources. Each use may cause some degradation of quality. By carefully managing both the flow of the streams and the quality of the used water we believe that waters may be reused many times without damage to subsequent users. We would not like the existing water quality held responsible for limiting either the population growth or the economic expansion of any area in the country. Both possibilities can be minimized if timely attention is given to long-range planning for the protection and the preservation of the streams, lakes, and underground water.